RGM-2106 Operational Manual

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1 Introduction

RoyalTek RGM-2106 is the smart antenna GPS module with SiRFstar IV GPS solution. The module embedded active Jammer remover to ensure fast and accurate navigation in hostile signal/high noise environment. Power by the new SiRFStar IV architecture, the module can acquire satellites as low as -163dBm better than SiRF Star III. The high sensitivity, low power, 48-channel GPS module is the best choice to be embedded in a portable device such as Car tracking device, Locator application, safety alarm device, personal locator and digital camera.

Product Features

- Wire to board connector type
- Additional 3 dB in track sensitivity is better than the Sirf Star III.
- Support MEMS Sensor to detection and wake up the device for power saving and longer battery life.
- Adaptive Micro-power controller- only 50 to 500uA to maintain hot start capability.
- Embedded InstantFix CGEE and Reverse CGEE (3 days) for faster warm start.
- Embedded active Jammer remover to ensure fast and accurate navigation in hostile signal environments – GSM, NB environments

1.1 Product applications

- Personal Navigation Device including GPS PDA and GPS Handheld
- Pet/personal Tracker, AVL / Location-Based Services Tracker
- Cameras / Digital camcorder

1.2 Product Picture

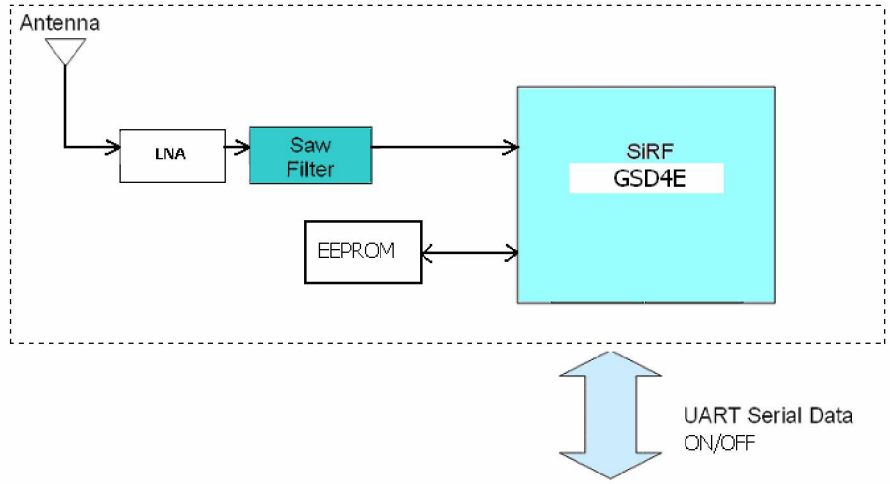
Figure 1-1 RGM-2106 Front View

Figure 1-2 RGM-2106 Bottom View

1.3 RGM-2106 System Block Diagram

System block diagram description :

a. External antenna.
b. 6 pin I/O pin

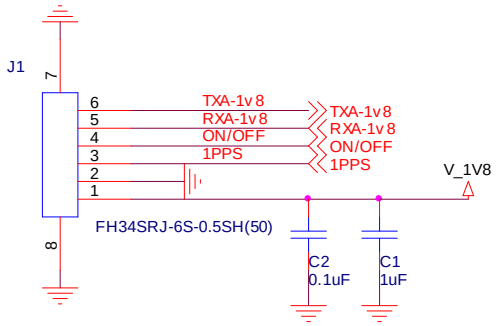


1.4 RGM-2106 Technical Specification

Impedance：50Ω

No	Function	Specification
GPS receiver		
1	Chipset	SiRFstarIV GSD4e-9311-TR Signature ROM
2	Frequency	L1 1575.42MHz
3	Code	C.A. Code.
4	Channels	48 track verification channels
5	Chipset Sensitivity	High sensitivity navigation engine (PVT) tracks as low as -163dBm
6	Chipset Cold start	35 sec (open sky)
7	Chipset Warm start	35 sec (open sky)
8	Hot start	1 sec (open sky)
9	Reacquisition	0.1sec typical
10	Position accuracy	2.5meters(50% 24hr static, -130dBm)
11	Maximum altitude	18288 m
12	Maximum velocity	514 m/s
13	Update rate	1Hz
14	Protocol setup	NMEA0183 standard V3.01 and backward compliance-Adjustable by firmware
15	LNA	Embedded 1 stage LNA
16	SBAS(Optional)	WAAS, EGNOS
17	Active Jammer Remover:	■ Removes in-band jammers up to 80 dB-Hz ■ Tracks up to 8 CW jammers
Interface		
18	I/O Pin	6pins
Power consumption		
19	VCC	DC +1.8V@ ±5%
20	Current	Normal mode :Avg. ≦ 65mA@1.8V(without ext. antenna) Hibernate mode: Avg.≦30uA @1.8V(without ext. antenna)
Environment		
21	Temperature	Operating : -30 ~ 85℃ Storage : -40 ~ 85℃
22	Humidity	≦95%

1.5 Application Circuit



Note:

- **V_1V8 (DC 1.8V@ 5% power Input)**

  This is the DC power supply input pin for GPS system. It provides voltage to module.

- **GND**

  GND provides the ground.

- **RXD**

  This is the main receiver channel and is used to receive software commands to the board from SIRFdemo software or from user written software.

- **TXD**

  This is the main transmitting channel and is used to output navigation and measurement data to SiRFdemo or user written software.

- **PPS (TIMEMARK)**

  This pin provides one pulse-per-second output from the board, which is synchronized to GPS time. Need firmware supporting. If don't used, can open.

  Note: **At present PPS function has not opened.**

- **Power**

  Connect VCC_IN_1V8 pin to DC 1.8V. The power supply must add bypass capacitor (10uF and 1uF).It can reduce the Noise from power supply and increase power stability.

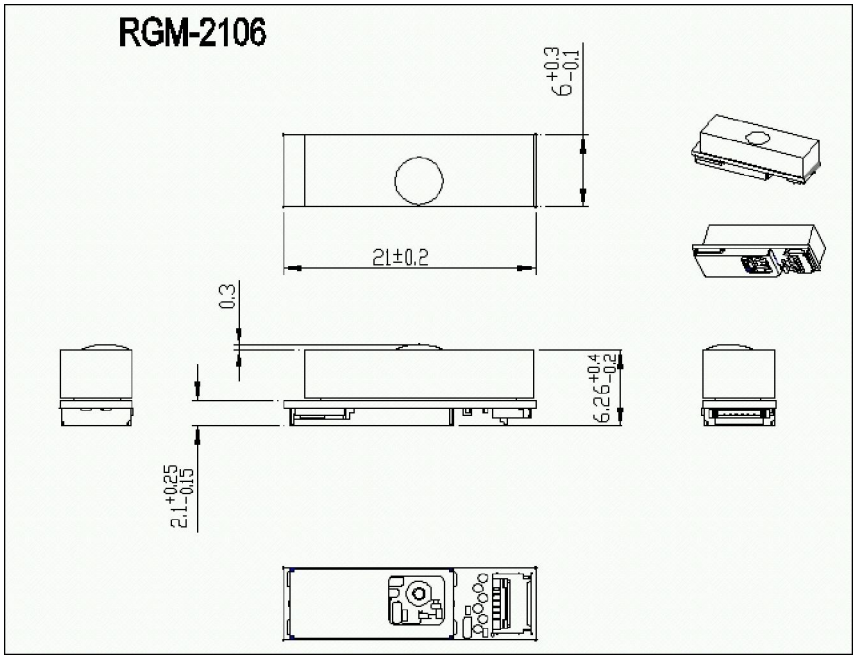
- **Shutdown**

  Shutdown the RGM-2106 module, don't remove the Vcc_IN_1V8 Pin, must be use on/off pulse make it into Hibernate mode.(It's will keep the Warm start and Hot start function work well)

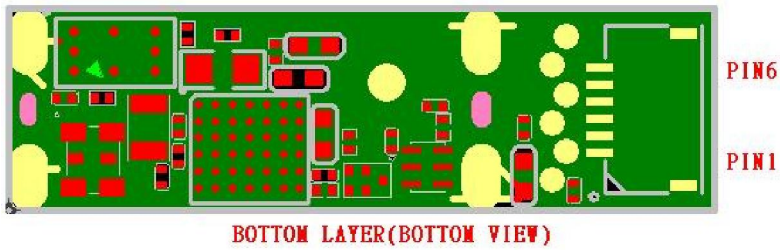
- **ON/OFF**

  Input pulse is required to start the system, and switch the operation mode tofull-power mode or Hibernate mode.

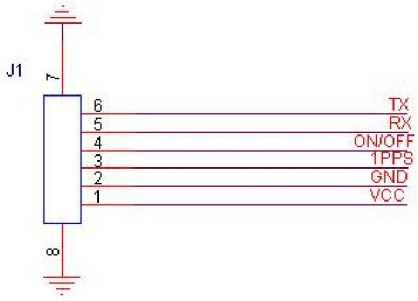
1.6 Mechanical



1.7 Hardware interface



BOTTOM LAYER(BOTTOM VIEW)



FH34SRJ-6S-0.5SH(50)

Pin Definition

Pin	Signal Name	I/O	Description	Characteristics
1	VCC_1V8	I	DC Supply Voltage input	DC +1.8V, RANGE : 1.71~1.89V
2	GND	G	Ground	Reference Ground
3	PPS	O	One pulse per second	$V_{OH} \geq 1.35V$ $V_{OL} \leq 0.4V$
4	ON_OFF	I	Edge triggered soft on/off request.	Power control pin ,need a pulse to ON or OFF the Chip set. (CMOS I/O run from 1.8v)
5	RXD	I	Serial port A	$3.6V \geq V_{IH} \geq 1.26V$ $-0.4V \leq V_{IL} \leq 0.45V$
6	TXD	O	Serial port A	$V_{OH} \geq 1.35V$ $V_{OL} \leq 0.4V$

Definition of Pin assignment

- V_1V8 (DC 1.8V@ 5% power Input)

  This is the DC power supply input pin for GPS system. It provides voltage to module.

- GND

  GND provides the ground.

- RXD

  This is the main receiver channel and is used to receive software commands to the board from SIRFdemo software or from user written software.

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- PPS (TIMEMARK)

  This pin provides one pulse-per-second output from the board, which is synchronized to GPS time. Need firmware supporting. If don't used, can open.

  Note: At present the PPS function has not open.

- Power

  Connect VCC_IN_1V8 pin to DC 1.8V. The power supply must add bypass capacitor (10uF and 1uF).It can reduce the Noise from power supply and increase power stability.

- Shutdown

  Shutdown the RGM-2106 module, don't remove the Vcc_IN_1V8 Pin, must be use on/off pulse make it into Hibernate mode.(It's will keep the Warm start and Hot start function work well)

- ON/OFF

  Input pulse is required to start the system, and switch the operation mode to full-power mode or Hibernate mode.

2 Software Interface

2.1 NMEA V3.0 Protocol

Its output signal level is TTL. It can support the following NMEA-0183 sentence.

Messages: GGA, GLL, GSA, GSV, RMC and VTG.

NMEA Output Messages: the Engine board outputs the following messages as shown in Table 2-1:

Table 2-1 NMEA-0183 Output Messages

NMEA Record	Description
GGA	Global positioning system fixed data
GLL	Geographic position – latitude / longitude
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
VTG	Course over ground and ground speed

2.1.1 GGA-Global Positioning System Fixed Data

Table 2-2 contains the values of the following example:

$GPGGA, 161229.487, 3723.2475, N, 12158.3416, W, 1, 07, 1.0, 9.0, M, , , ,0000*18

Table 2-2 GGA Data Format

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		Dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	meters	
Units	M	meters	
Geoid Separation		meters	
Units	M	meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
＜CR＞＜LF＞			End of message termination

Table 2-3 Position Fix Indicators

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3-5	Not Supported GPS PPS Mode, fix valid
6	Dead Reckoning Mode, fix valid

2.1.2 GLL-Geographic Position –Latitude/Longitude

Table 2-4 contains the values of the following

Example: $GPGLL, 3723.2475, N, 12158.3416, W, 161229.487, A*2C

Table 2-4 GLL Data Format

Name	Example	Units	Description
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		Dddmm.mmmm
E/W Indicator	W		E=east or W=west
UTC Position	161229.487		hhmmss.ss
Status	A		A=data valid or V=data not valid
Mode	A		A=Autonomous, D=DGPS, E=DR
Checksum	*2C		
＜CR＞＜LF＞			End of message termination

2.1.3 GSA-GNSS DOP and Active Satellites

Table 2-5 contains the values of the following example:

$GPGSA, A, 3, 07, 02, 26, 27, 09, 04, 15, , , , , , 1.8,1.0,1.5*33

Table 2-5 GSA Data Format

Name	Example	Units	Description
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 4-2
Mode 2	3		See Table 4-1
Satellite Used	07		Sv on Channel 1
Satellite Used	02		Sv on Channel 2
….			….
Satellite Used			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
＜CR＞＜LF＞			End of message termination

Table 2-6 Mode 1

Value	Description
1	Fix not available
2	2D
3	3D

Table 2-7 Mode 2

Value	Description
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically switch 2D/3D

2.1.4 GSV-GNSS Satellites in View

Table 2-8 contains the values of the following example:

$GPGSV, 2, 1, 07, 07, 79, 048, 42, 02, 51, 062, 43, 26, 36, 256, 42, 27, 27, 138, 42*71$GPGSV, 2, 2, 07, 09, 23, 313, 42, 04, 19, 159, 41, 15, 12, 041, 42*41

Table 2-8 GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages[1]	2		Range 1 to 3
Messages Number[1]	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1(Range 1 to 32)
Elevation	79	degrees	Channel 1(Maximum 90)
Azimuth	048	degrees	Channel 1(True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
….			….
Satellite ID	27		Channel 4(Range 1 to 32)
Elevation	27	degrees	Channel 4(Maximum 90)
Azimuth	138	degrees	Channel 4(True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
＜CR＞＜LF＞			End of message termination

[1]Depending on the number of satellites tracked multiple messages of GSV data may be required.

2.1.5 RMC-Recommended Minimum Specific GNSS Data

Table 2-9 contains the values of the following example:

$GPRMC, 161229.487, A, 3723.2475, N, 12158.3416, W, 0.13, 309.62, 120598, ,*10

Table 2-9 RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	

Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation		degrees	E=east or W=west
Mode	A		A=Autonomous, D=DGPS, E=DR
Checksum	*10		

2.1.6 VTG-Course Over Ground and Ground Speed

Table 2-10 contains the values of the following example:

$GPVTG, 309.62, T, , M, 0.13, N, 0.2, K*6E

Table 2-10 VTG Data Format

Name	Example	Units	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometer per hour
Mode	A		A=Autonomous, D=DGPS, E=DR
Checksum	*6E		
＜CR＞＜LF＞			End of message termination

3 Contact Information Section

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4 Revision History

Title	RGM-2106 GPS Smart Antenna		
Doc Type	Operational Manual		
Revision Number	Date	Author	Change notice
0.1	2010/11/15	May Chen	Initial Released

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